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(54) **APPARATUS AND METHOD OF DISPLAYING BACKLIGHT CONSUMPTION TIME FOR LCD MONITOR**

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(52) **U.S. Cl.** **345/102**; 345/87
(58) **Field of Search** 345/87, 102, 36–38, 345/117

(56) **References Cited**

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(57) **ABSTRACT**

A backlight consumption time display method and apparatus for an LCD monitor is disclosed. A the backlight consumption time stored in a memory storage unit with a preset backlight maximum consumption time is periodically compared. A backlight replacement instruction message is displayed on the screen when a hitherto backlight consumption time exceeds the maximum consumption time and, after the backlight replacement, the backlight consumption time stored in the memory storage unit is reset using a reset key in the key input unit. A timer is operated when a backlight driving control signal is turned on, a backlight consumption time preset in a memory storage unit is counted and the counted value is stored in a memory storage unit.

6 Claims, 2 Drawing Sheets

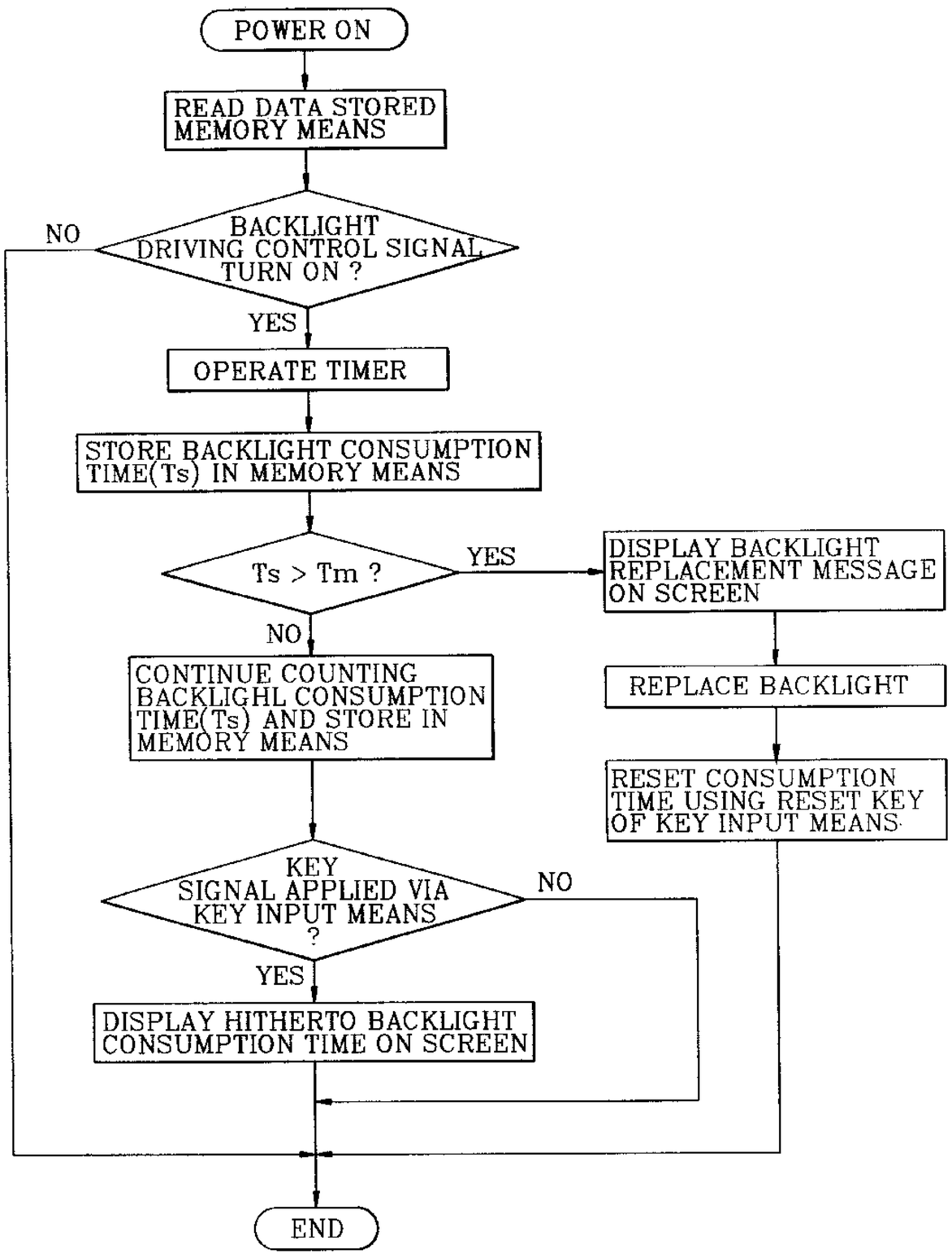


FIG. 1

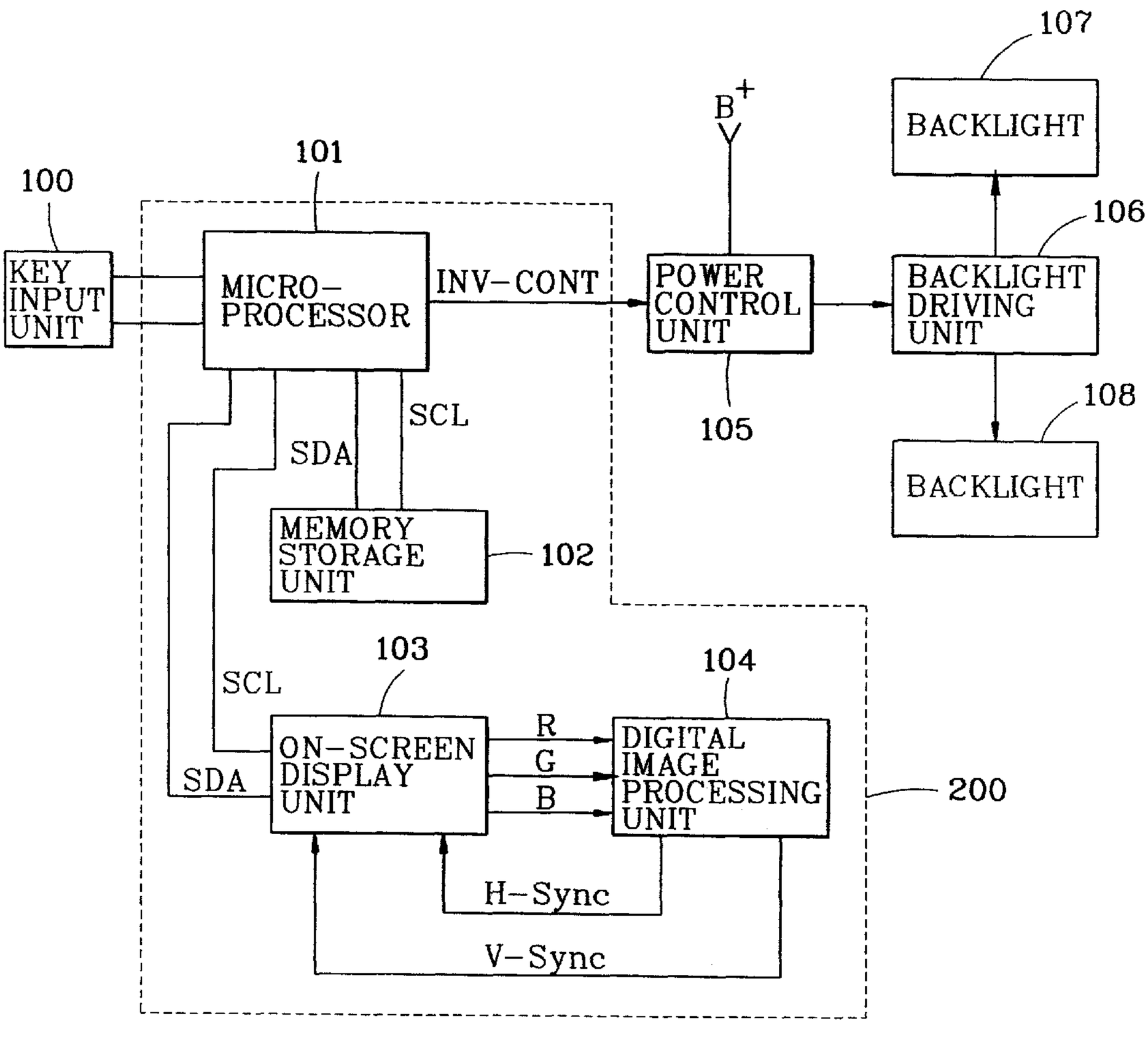
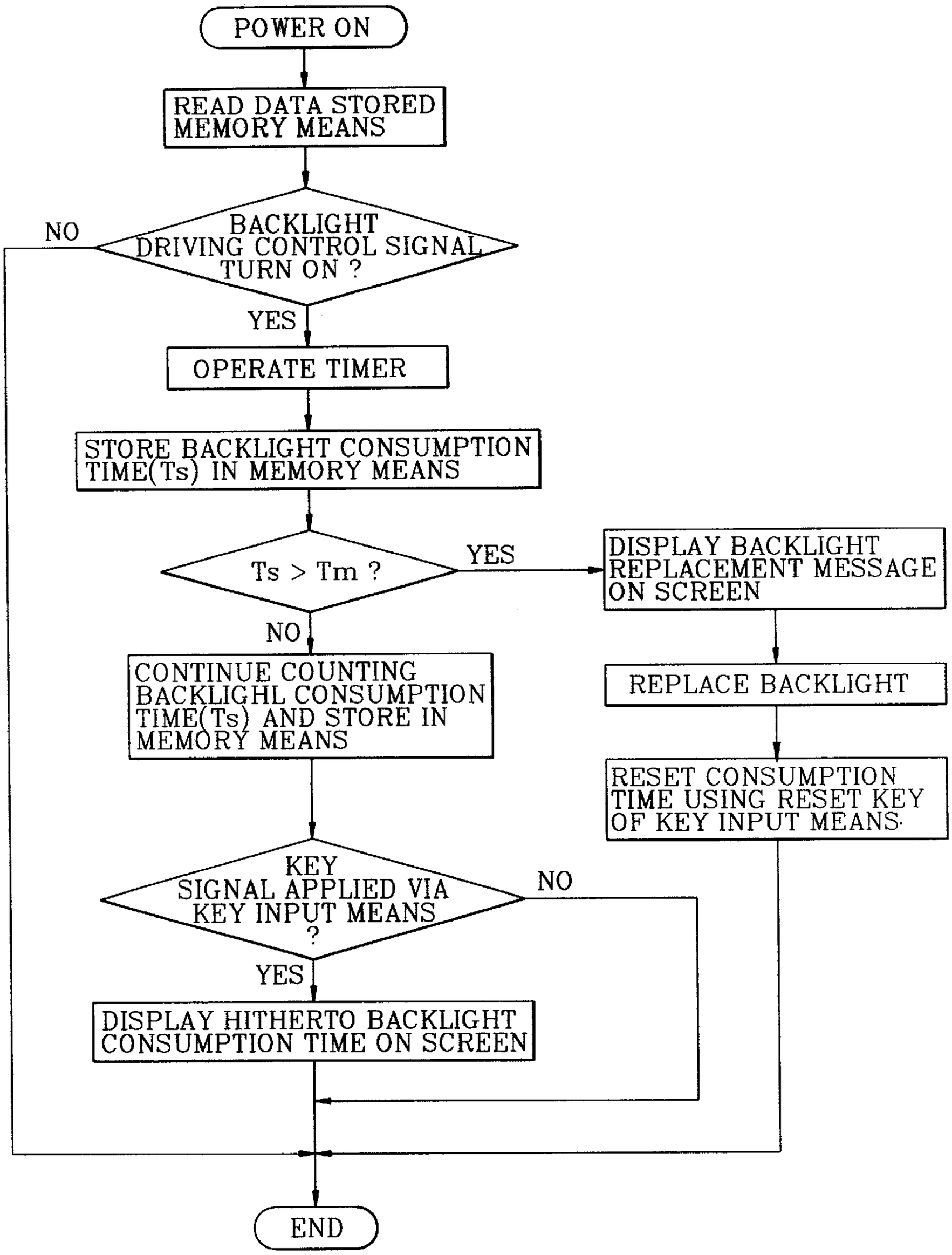

100
101
KEY INPUT UNIT
MICRO-PROCESSOR
INV-CONT
B+
POWER CONTROL UNIT
105
107
BACKLIGHT
106
BACKLIGHT DRIVING UNIT
108
BACKLIGHT
SCL
SDA
MEMORY STORAGE UNIT
102
103
104
SCL
SDA
ON-SCREEN DISPLAY UNIT
R
G
B
DIGITAL IMAGE PROCESSING UNIT
200
H-Sync
V-Sync

FIG. 2


POWER ON
READ DATA STORED MEMORY MEANS
BACKLIGHT DRIVING CONTROL SIGNAL TURN ON ?
NO
YES
OPERATE TIMER
STORE BACKLIGHT CONSUMPTION TIME(Ts) IN MEMORY MEANS
Ts > Tm ?
YES
NO
DISPLAY BACKLIGHT REPLACEMENT MESSAGE ON SCREEN
REPLACE BACKLIGHT
RESET CONSUMPTION TIME USING RESET KEY OF KEY INPUT MEANS
CONTINUE COUNTING BACKLIGHL CONSUMPTION TIME(Ts) AND STORE IN MEMORY MEANS
KEY SIGNAL APPLIED VIA KEY INPUT MEANS ?
NO
YES
DISPLAY HITHERTO BACKLIGHT CONSUMPTION TIME ON SCREEN
END

APPARATUS AND METHOD OF DISPLAYING BACKLIGHT CONSUMPTION TIME FOR LCD MONITOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a backlight for an LCD (liquid crystal display) monitor, and more particularly, to an improved apparatus and method of displaying a backlight consumption time for an LCD monitor wherein the backlight consumption time is displayed on screen.

2. Description of the Background Art

A conventional LCD monitor has so far provided no particular composition and method for visually displaying its backlight consumption time. Assuming that an average longevity of LCD monitor backlight is around 50,000 hours, an average longevity of the backlight is understood to range from 10,000~25,000.

Theoretically, two to five times should a user replace the backlight in use for an LCD monitor.

Since the conventional LCD monitor is not provided with a device which informs a user of the backlight longevity of an LCD monitor, especially when the backlight is almost used up, there is strongly required such a device for a prior recognition of the backlight longevity.

SUMMARY OF THE INVENTION

The present invention is directed to overcoming the conventional disadvantages.

Therefore, it is an object of the present invention to provide an on-screen display apparatus which informs a user of a backlight replacement time, if the backlight is almost used up, by periodically storing its consumption time in a memory.

To achieve the above-described object, there is provided an on-screen display apparatus of backlight consumption time for an LCD monitor according to the present invention which includes a key input unit, a backlight data processing unit, a power control unit for outputting a driving voltage in response to an output signal of the backlight data processing unit, and a backlight driving unit for receiving a driving voltage from the power control unit and turning on the backlight.

Further, to achieve the above-described object, there is provided an onscreen display method of backlight consumption time according to the present invention which includes a first step for operating a timer when a backlight driving control signal is turned on, counting a backlight consumption time preset in a memory storage unit and storing the counted value in a memory storage unit, a second step for periodically comparing the backlight consumption time stored in the memory storage unit with a preset backlight maximum consumption time, a third step for displaying a backlight replacement instruction message on the screen when the hitherto backlight consumption time exceeds the maximum consumption time according to the determined result in the second step and resetting, after the backlight replacement, the backlight consumption time stored in the memory storage unit using a reset key in the key input unit, and a fourth step for continuously counting the consumption time when the hitherto backlight consumption time does not exceed the maximum consumption time according to the determined result in the second step and storing the counted value in the memory storage unit, and displaying on the screen the hitherto backlight consumption time stored in the

memory storage unit when a key signal for displaying is applied to the key input unit.

The features and advantages of the present invention will become more readily apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific example, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become better understood with reference to the accompanying drawings which are given only by way of illustration and thus are not limitative of the present invention, wherein:

FIG. **1** is a block diagram illustrating a backlight longevity display apparatus for an LCD monitor; and

FIG. **2** is a flow chart illustrating a backlight longevity display apparatus for an LCD monitor.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. **1**, the backlight longevity time display apparatus for an LCD monitor includes a key input unit **100** having a key for displaying a hitherto backlight consumption time and a reset key for resetting a pre-stored backlight consumption time when replacing the backlight, a memory storage unit **102** in a backlight data processing unit **200** for storing therein the hitherto backlight consumption time, a microprocessor **101** in the backlight data processing unit **200** for displaying the hitherto backlight consumption time Ts stored in the memory storage unit **102**, comparing the hitherto backlight consumption time Ts with a preset maximum consumption time Tm, determining the backlight longevity and controlling a series of steps so as to display the determined result, an on-screen display unit **103** connected to the microprocessor **101** and for outputting the hitherto backlight consumption time to an OSD screen, a digital image processing unit **104** for image-processing color signals R, G, B from the on-screen display unit **103** and displaying the processed result on an LCD monitor screen as an on-screen menu, a backlight driving unit **106** for driving the backlight in accordance with the control of the microprocessor **101**, backlights **107**, **108** for illuminating the LCD monitor under the control of the backlight driving unit **106**, and a power control unit **105** for controlling power supply to the microprocessor **101** and the backlight driving unit **106**.

FIG. **2** is a flow chart illustrating a backlight consumption time display method for an LCD monitor according to the present invention. As shown therein, the method includes a first step for operating a timer when a backlight driving control signal is turned on, counting a backlight consumption time Ts preset in the memory storage unit **102** and storing the counted value in the memory storage unit **102**, a second step for periodically comparing the backlight consumption time Ts stored in the memory storage unit **102** with a preset backlight maximum consumption time Tm, a third step for displaying a backlight replacement instruction message on the screen if the hitherto backlight consumption time Ts exceeds the maximum consumption time Tm according to the determined result in the second step, and resetting, after the backlight replacement, the backlight consumption time stored in the memory storage unit **102** using the reset key in the key input unit **100**, a fourth step for continuously

counting the consumption time if the hitherto backlight consumption time Ts does not exceed the maximum consumption time Tm according to the determined result in the second step and storing the counted value in the memory storage unit **102**, and displaying on the screen the hitherto backlight consumption time stored in the memory storage unit **102** if a key signal for displaying is applied to the key input unit **100**.

The operation of the thusly constituted on-screen display apparatus of a backlight consumption time for an LCD monitor will now be explained in further detail with reference to FIGS. **1** and **2**.

First, when a power is applied to an LCD monitor, the microprocessor **101** reads the backlight consumption time Ts stored in the memory storage unit **102** through a serial clock SCL terminal and a serial data SDA terminal and writes the read value in a RAM in the microprocessor **101**.

At the same time, when a high level signal is outputted through a driving control terminal INV-CONT of the microprocessor **101** and the power control unit **105** is driven, a driving voltage B+ is outputted to the backlight driving unit **106**.

The backlight driving unit **106** serves to turn on the backlights **107**, **108** respectively attached to upper and lower portion of the LCD monitor in accordance with the driving voltage B+applied from the power control unit **105**, thereby controlling brightness of the screen.

The microprocessor **101** starts counting the backlight consumption time written in the RAM from the moment at which the backlight driving control signal INV-CONT by an internally provided count, and the consumption time of each of the counted backlights **107**, **108** is stored in the memory storage unit **102** having an EEPROM as a non-volatile memory device through the serial clock SCL and the serial data SDA terminals.

Then, the microprocessor **101** periodically compares the consumption time Ts of each of the backlights **107**, **108** stored in the memory storage unit **102** with the preset maximum consumption time Tm. So, if the backlight consumption time Ts exceeds the maximum consumption time Tm it is determined the backlight is almost used up. Accordingly, a backlight replacement instruction is outputted to the on-screen display unit **103** through the serial clock SCL terminal and the serial data SDA terminal.

The on-screen display unit **103** processes, using color signals R, G, B, a backlight displacement outputted from the microprocessor **101** within horizontal and vertical synchronous signals H-sync, V-sync cycles applied from the digital image processing unit **104** and outputs the result to the digital image processing unit **104**. The digital image processing unit **104** image-processes the color signals R, G, B outputted from the on-screen display unit **103** and displays the on-screen menu **1** (backlight replacement and service instructing menu) on the LCD monitor screen.

That is, when the backlight consumption time Ts has reached a maximum consumption time Tm, the replacement message is automatically displayed on the LCD monitor screen.

When the backlights **107**, **108** are replaced, the backlight consumption time Ts stored in the memory storage unit **102** is reset by use of the key input unit **100**, whereby the backlight consumption time is reset so as to be counted.

Also, when the consumption time Ts of the backlights **107**, **108** does not exceed the maximum consumption time Tm, the microprocessor **101** continues counting the backlight consumption time, thereby updating the memory storage unit **102**.

If a user wants to check up the hitherto consumption time of each of the backlights **107**, **108**, the key input unit **100** is pressed twice. Then, the microprocessor **101** outputs the hitherto backlight consumption time stored in the memory storage unit **102** to the on-screen display unit **103** through the serial clock SCL terminal and the serial data SDA terminal.

The on-screen display unit **103** processes the data representing the hitherto backlight consumption time applied from the microprocessor **101** within the horizontal and vertical synchronous signals H-sync, V-sync cycles by use of the color signals R, G, B. The digital image processing unit **104** image-processes the color signals R, G, B outputted from the on-screen display unit **103** and displays an on-screen menu **2** (hitherto backlight consumption time) on the LCD monitor screen.

In a power saving mode, a low level signal is outputted from the driving control terminal INV-CONT of the microprocessor **101** so as to turn off the backlights **107**, **108**, whereby the backlight consumption time stored in the memory storage unit **102** is not increased.

As described above, the backlight consumption time display apparatus according to the present invention allows the hitherto backlight consumption time to be displayed on the LCD monitor screen with the selection of the key input unit and when the maximum consumption time of the backlight has been reached, a backlight replacement instruction message is automatically presented to the user who then can determine when to replace the backlight, thereby realizing a further convenience of the user.

As the present invention may be embodied in several forms without departing from the spirit of essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within meets and bounds of the claims, or equivalences of such meets and bounds are therefore intended to embrace the appended claims.

What is claimed is:

1. An apparatus of displaying a backlight consumption state in an LCD (liquid crystal display) monitor which displays an image on the monitor screen, comprising:

a key input unit;

a backlight data processing unit;

a power control unit for outputting a driving voltage in response to an output signal of the backlight data processing unit; and

a backlight driving unit for receiving a driving voltage from the power control unit and turning on the backlight;

wherein the backlight data processing unit comprises:

a memory storage unit for storing therein a hitherto backlight consumption time;

a microprocessor for periodically comparing the hitherto backlight consumption time with a preset maximum consumption time in accordance with the data stored in the memory storage unit so as to determine the backlight longevity and outputting a backlight replacement instruction message when the hitherto backlight consumption time exceeds the preset maximum consumption;

an on-screen display unit for processing the backlight replacement instruction message received from the

microprocessor using color signals within an on-screen horizontal and vertical synchronous signal cycles; and

a digital image processing unit for image-processing the color signals outputted from the on-screen display unit.

2. The apparatus of claim **1**, wherein the key input unit comprises: a key for displaying the hitherto backlight consumption time; and

a reset key for resetting the preset backlight consumption time when the backlight is replaced.

3. The apparatus of claim **1**, wherein the memory storage means is an EEPROM.

4. The apparatus of claim **1**, wherein the microprocessor includes a memory and a counter therein and wherein the counter is driven from the moment when a backlight driving control signal is turned on and counts the backlight consumption time written on the memory.

5. The apparatus of claim **4**, wherein the memory is a RAM.

6. A backlight consumption time display method for an LCD monitor, comprising:

a first step for operating a timer when a backlight driving control signal is turned on, counting a backlight consumption time preset in a memory storage unit and storing the counted value in a memory storage unit;

a second step for periodically comparing the backlight consumption time stored in the memory storage unit with a preset backlight maximum consumption time;

a third step for displaying a backlight replacement instruction message on the screen when the hitherto backlight consumption time exceeds the maximum consumption time according to the determined result in the second step and resetting, after the backlight replacement, the backlight consumption time stored in the memory storage unit using a reset key in the key input unit; and

a fourth step for continuously counting the consumption time when the hitherto backlight consumption time does not exceed the maximum consumption time according to the determined result in the second step and storing the counted value in the memory storage unit, and displaying on the screen the hitherto backlight consumption time stored in the memory storage unit when a key signal for displaying is applied to the key input unit.

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